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Documentation TwinLife Data: Report Cards

v1.1.0

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Documentation TwinLife Data: Report Cards

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Change log v1.1.0

Compared to the previous version (Mattheus et al., 2017), the following changes have been made:

- Updated information on the encoding of behavioral assessments (*Kopfnoten*) in data release v4-1-0 and was added (p. 8)
- English translations of school subjects in Appendix A were improved
- Minor changes concerning formatting and wording were made
- Sources were updated

Due to the federal system and a long historic tradition, the German school system is quite complex. It is characterized for example by early selection and placement of students based on ability and interests and a variety of possible schooling tracks. We thus start this technical report by giving an in-depth description of the German school system in general, before we explain the actual collection and usage of the report card data in TwinLife.

Description of the German School System

General Overview

School is compulsory for all children living in Germany starting from the age of six. At that age, children normally start to attend school. Compulsory education usually lasts until the end of the school year in which the child reaches the age of 18. Unlike in other countries, home schooling is not allowed in Germany. Children are required to attend public schools or approved private schools. The rules governing compulsory schooling vary between German federal states (*Bundesländer*).

Usual subjects include mathematics, German, English and in addition further languages, social studies, natural sciences, arts and physical education. Although education is a function of the federal states, and there are differences from state to state, some generalizations are possible (for a general overview see Figure 1). In the following, the structure of the German school system is explained in greater detail with a focus on presenting the most common school types and its differences concerning the level of education.

The German school system uses a 6-point grading scale to evaluate the performance of school children. Grades vary from 1 (excellent, *sehr gut*) to 6 (insufficient, *ungenügend*). In addition to describing students' general performance in a subject, grades are used to decide upon students' placement within and between schools, i.e. if a student's grades are not sufficiently high (e.g. failure in two or more subjects), they have to stay down a year and repeat the contents in all subjects or switch to a lower-level school type (e.g. from *Realschule* to *Hauptschule*). In some states, not only the students' academic performance is evaluated, but also other qualifications such as social skills, participation in class and motivation that are referred to as *Kopfnoten*. They are called *Kopfnoten*, because they used to be listed in the head of the certificate prior to the other grades.

Different School Types

Grundschule

From grades 1 through 4 children attend elementary/primary school (*Grundschule*), where the subjects taught are the same for all children. In the states Berlin and Brandenburg, primary school also includes grade 5 and 6, called *Orientierungsstufe/Orientierungsschule*, where the children are taught in different groups in the subjects German, Mathematics and English according to their proficiency level. However, high-achieving students can leave primary school before sixth grade to switch to *Gymnasium*. Sometimes children receive a written feedback at the end of the term instead of grades.

Entry into the multi-tier school system

After the 4th grade, children attend one of four different kinds of schools: *Hauptschule*, *Realschule*, *Gymnasium* or *Gesamtschule*. *Grundschule* teachers recommend their students to a particular school based on academic achievement, self-confidence and ability to work independently. However, in most states, parents have the final say as to which of the following school types their child attends following the fourth grade. This early selection process characterizes the German school system in contrast to other countries.

Hauptschule

The *Hauptschule* (grades 5-9/10) teaches mainly the same subjects as the *Realschule* and *Gymnasium*, but at a slower pace and with some more vocational-oriented courses, e.g., home economics, business and employment studies and technology. Students graduate after grade 9 and receive a *einfachen Hauptschulabschluss* or take an additional examination after grade 10 to acquire a higher qualification (*qualifizierender Hauptschulabschluss*). Both can lead to part-time enrollment in a vocational school (*Berufsschule*) combined with apprenticeship training until at least the age of 18.

Realschule

The *Realschule* (grades 5-10) leads to part-time vocational schools and higher vocational schools. The students can select different compulsory subjects, either a natural scientific or technical subject, an economic or social science course or a second language.

It is possible for students with an above-average leaving certificate at the *Realschule* (*Fachoberschulreife*) to switch to a specialized secondary school (*Fachoberschule*) where you can obtain an entrance qualification for the university of applied sciences (*Fachhochschulreife*) or to a transitional period at a regular *Gymnasium*.

In some cases, *Hauptschule* and *Realschule* are combined into one school type (*Verbundene Haupt- und Realschule*; in some states also called *Mittelschule*), where students can achieve both leaving certificates depending on the courses they attend.

After graduating from *Hauptschule* or *Realschule* (or after receiving an equivalent leaving certificate from another school type), students usually have not reached the age of 18 yet, so school is still compulsory. Students starting an apprenticeship training thus enroll in a part-time vocational school (*Berufsschule*); this program is called dual vocational training (*Duale Berufsausbildung*) and takes from 2 to 3,5 years. As another possibility, students enroll in a

full-time vocational school (*Berufsfachschule*) to start a school-based vocational training (*schulische Berufsausbildung*), usually lasting one to 3 years. If students do not directly enter a vocational training, they start a vocational preparation training (*Berufsfachschule ohne Berufsabschluss*).

Gymnasium

Students attend *Gymnasium* for eight or nine years (depending on the state) to achieve a final qualification called the *Abitur*, which is regarded as a certificate of aptitude for higher education. In the senior years of *Gymnasium*, students attend two types of courses: Advanced placement courses (*Leistungskurse*) and basic courses (*Grundkurse*). They choose the subjects of their advanced and basic courses according to their interests and abilities. At the end of the final grade, students must take and pass qualification exams (*Abiturprüfung*).

The *Gymnasium* is intended for students who will go on to study at some kind of university or college or take part in a dual study program (theory at a university/college, practical work within a company). Compared to other school types, greater personal initiative, motivation and overall performance is expected at *Gymnasium*, e.g., studying a second foreign language is required.

As an exceptional rule, it is possible to graduate from *Gymnasium* with a *Hauptschule* certificate (after year 9), *Fachoberschulreife* (after year 10) or receive the theoretical part of a *Fachhochschulreife* (after year 11 or 12, depending on the state). However, these options are not common.

Gesamtschule

A fourth option after *Grundschule* is a comprehensive school (*Gesamtschule*), only found in some states. Students of all ability levels enroll in this school and are assigned to basic or advanced courses according to their performance level. They can achieve the *Hauptschule* certificate (after grade 9 or 10), the *Fachoberschulreife* (after year 10) or *Abitur* (after year 13).

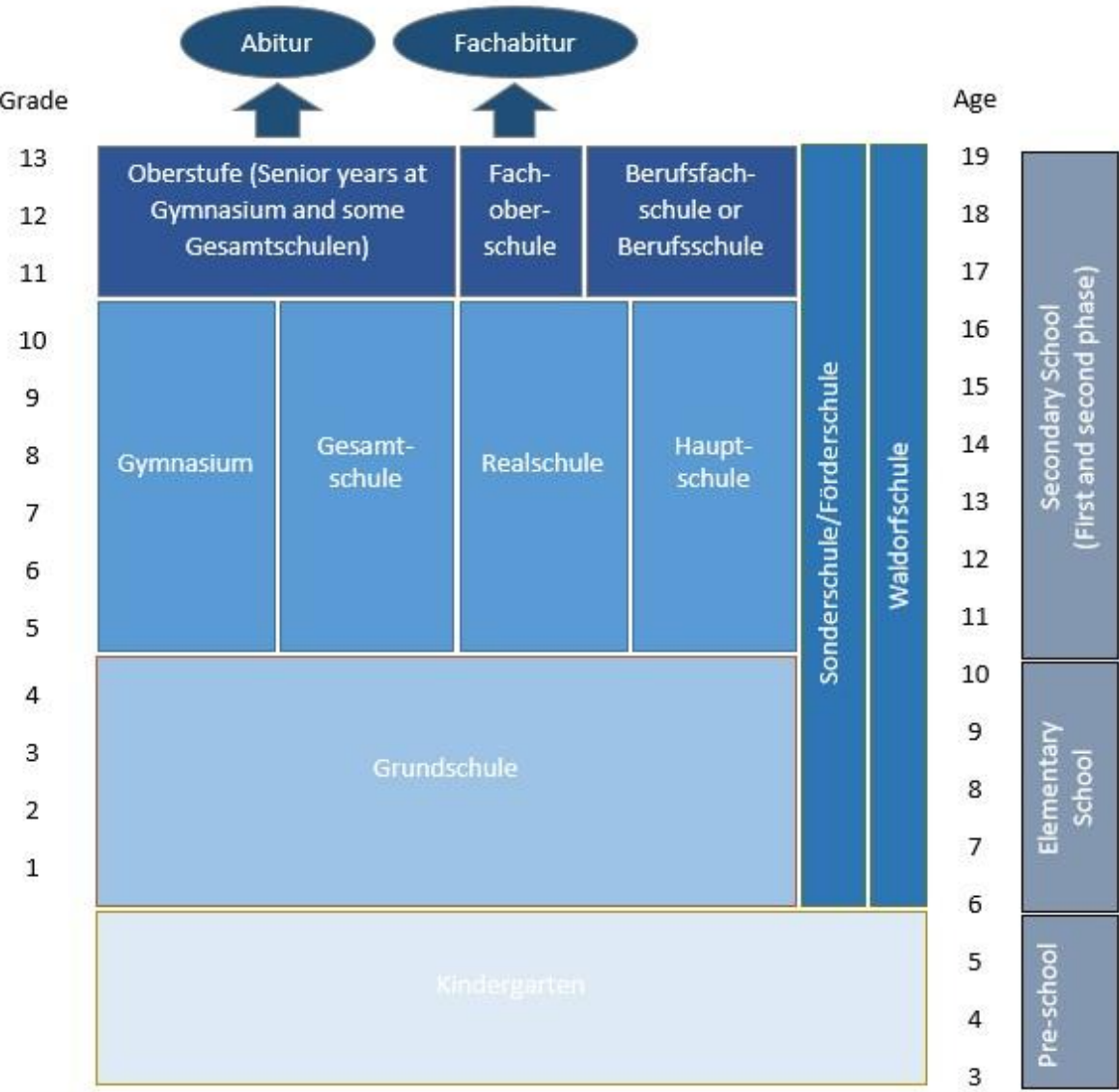
Other School Types

Students with special education needs (e.g., physically and mentally disabled students) may attend special schools (*Förderschule*) staffed with specially trained teachers.

Waldorf schools educate students of all ability levels together and implement a pedagogy of encouragement and support that is different from regular schools. Nevertheless, students can achieve ordinary leaving certificates.

Although the majority of schools in Germany are public schools, there are some private schools as well. These schools usually charge tuition and may offer varied courses leading to ordinary leaving certificates, mostly *Abitur*. Some private schools are boarding schools (*Internat*) as well.

Figure 1. Overview of the German school system



Data collection and encoding system

Data collection

Data was collected by taking photos of the most recent report card of the children. This information was transferred to a more generalized report card-scheme. All corresponding variables belong to module 9 (variable stem ‘cer’) and contain basic (e.g., school type, school year, grade) as well as more detailed information (e.g., grades in specific subjects). The report card photo data can be found in variables cer2000 – cer3002.

If the actual report card was not available, the parents or the children themselves were asked questions about their academic performance (e.g., school type, grades in German and mathematics and type of leaving certificate if existent). The corresponding variables (cer1100 – cer1800) can be found in the data set as well.

Encoding system

The description of the different school types emphasizes the complexity of the German school system. In addition, it helps to retrace the encoding of the school types in numerics within the documentation of the school reports. Table 1 displays the school types and the corresponding numerics in the encoding system (cer2003g).

Table 1. Encoding of school types

| | | | |
|---|----------------------------------|----|---------------------------|
| 1 | Grundschule | 8 | Gymnasium (auch Kolleg) |
| 2 | Orientierungsschule | 9 | Sonderschule/Förderschule |
| 3 | Hauptschule | 10 | Mittelschule |
| 4 | Realschule | 11 | Fachoberschule |
| 5 | Verbundene Haupt- und Realschule | 12 | Berufsschule |
| 6 | Gesamtschule | 13 | Berufsfachschule |
| 7 | Waldorfschule | 14 | Sonstiges/Other |

Moreover, the date of issue (cer2000) and the semester (cer2001; 1= semester in autumn; 2= semester in spring) of the report card and the current grade (cer2002) are documented within the encoding system. Beside the values 1 to 13 for the grade, three values were added to differentiate the grades in senior years of *Gymnasium* or *Gesamtschule* (see table 2)

Table 2. Senior grades in Gymnasium and Gesamtschule

| | |
|----|--------------------|
| 20 | Introductory phase |
| 21 | First senior year |
| 22 | Second senior year |

If the school report includes a graduation certificate (cer2100), it is coded with value 1 (1 = “Yes, it is a graduation certificate”, 2 = “no graduation”) and the type of graduation (cer2101) is also mentioned. Table 3 contains the different leaving certificates and the corresponding numerics.

Table 3. Encoding of leaving certificates

| | |
|---|---|
| 1 | School leaving certificate without graduation |
| 2 | Hauptschulabschluss |
| 3 | Realschulabschluss |
| 4 | Fachhochschulreife (graduation of Fachoberschule) |
| 5 | Abitur/Hochschulreife |
| 6 | Other school leaving certificate |

The most common school subjects are listed in the encoding system (cer2000 – cer2233 and cer2300 – cer2303; see also Appendix A). Each subject in the school report and the received grade is entered into the encoding system. If necessary, the grades of up to four additional subjects that are not included in the previous list are entered as “*Weiteres Fach Note*” (cer2235 – cer2241). The remaining subjects are counted and their number is listed (cer3000).

In addition to the regular grades evaluating students’ academic performance, in some states children also receive *Kopfnoten* regarding their social behavior, participation in class and motivation. These are usually divided in at least two assessments but depending on the state further subdivisions are common. They are either assessed through numeric grades (on four- to six-point scales) or as written statements. To facilitate comparability, we aggregated and improved the recoding of assessments from data release v4-1-0 onwards (in previous releases cer2242 – cer2250 contain the relevant information). The individual assessments included in previous datasets are now combined into two broader domains to ensure data protection since some of the individual assessments have small numbers of valid cases because specific assessments might only be available in some states. The domain Willingness to learn combines assessments on motivation, diligence, independence and effort, while the domain Social behavior included assessments on conflict management, ability to cooperate and taking on responsibility. The dataset includes variables for both domains, first, in the form of numeric grades (cer2300 and cer2302; 1 = very good – 4 = not satisfactory) and, second, in the form of categorical ratings based on the corresponding written statements (cer2301 and cer2303; 1 = positive assessment – 3 = negative assessment). In addition, we now treated the two types of assessment separately because numeric grades taken directly from the report cards provide a more objective evaluation than the ratings of written statements do. In previous releases both types of assessments were combined into one variable.

Finally, in variable cer3002, it is specified whether the assessment of the students’ performance took place in the form of grades (= 0), written statements (= 1) or a categorical rating system (= 2).

Handling of missing data

There are different reasons for missing data, for example the picture that was taken is out of focus, the second page of the school report is not available or the student received no grades because of an illness. In these cases, the school report is encoded nonetheless and missing values are used to specify the reason why data is missing. In some elementary school report cards, the missing value -95 is also used if the student received a written feedback without any grades. Table 4 lists the utilized missing values and the assigned numerics.

Table 4. Missing values

| | |
|-----|-----------------------------------|
| -86 | Not available/empty/not codable |
| -89 | Not visible/readable |
| -90 | No participation in survey period |
| -92 | No participation in survey module |
| -95 | Not applicable |

Sources

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Appendix A

School Subjects, their English translation and variable name in the data set.

| Variable name | Subject in German | Subject in English |
|---------------|--|---|
| cer2200 | Mathematik | Mathematics |
| cer2201 | Deutsch | German |
| cer2202 | Sprachgebrauch | Linguistic usage |
| cer2203 | Sprachgebrauch mündlich | Linguistic usage (oral) |
| cer2204 | Sprachgebrauch schriftlich | Linguistic usage (written) |
| cer2205 | Lesen | Reading |
| cer2206 | Schrift | Writing |
| cer2207 | Rechtschreibung | Orthography |
| cer2208 | Englisch | English |
| cer2209 | Weitere Fremdsprache | Further foreign language |
| cer2211 | Chemie | Chemistry |
| cer2212 | Physik | Physics |
| cer2213 | Biologie | Biology |
| cer2214 | Informatik | Computer science |
| cer2215 | Naturwissenschaften | Science |
| cer2216 | Sachunterricht/ Heimat- und Sachkunde | Regional history and geography |
| cer2217 | Sozialwissenschaften/Gesellschaftslehre | Social sciences |
| cer2218 | Geschichte | History |
| cer2219 | Erdkunde | Geography |
| cer2220 | Politik | Political science |
| cer2221 | Politik/Wirtschaft | Politics/economics |
| cer2222 | Religionslehre | Religion |
| cer2224 | Ethik | Ethics |
| cer2224 | Philosophie | Philosophy |
| cer2225 | Kunst | Art |
| cer2226 | Musik | Music |
| cer2227 | Textilgestaltung | Textile design |
| cer2228 | Arbeitslehre | Business and employment studies |
| cer2229 | Technik | Technics |
| cer2230 | Werken | Carpentry and handicrafts |
| cer2231 | Hauswirtschaft | Home economics |
| cer2232 | Wirtschaft/Volkswirtschaft | Economics |
| cer2233 | Sport | Physical Education |
| cer2300 | Kopfnote Mitarbeit – Note | Willingness to learn – grade |
| cer2301 | Kopfnote Mitarbeit – schriftl. Bewertung | Willingness to learn – written assessment |
| cer2302 | Kopfnote Sozialverhalten – Note | Social behavior – grade |
| cer2303 | Kopfnote Sozialverhalten – schriftl. Bewertung | Social behavior – written assessment |